

Original Research Article

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Study of Breeding Biology and Egg Parameters of Red-Wattled Lapwing (*Vanellus indicus*) in Agri- Fields of Sirsa, Haryana, India

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ABSTRACT

This study documented some aspects of breeding biology and egg parameters of Red-Wattled Lapwing (*Vanellus indicus*) such as nest structure, nesting material, breeding season, clutch size, egg parameters, incubation period, hatching success in agricultural fields of village Ramnagar, Sirsa, Haryana. During breeding season the male bird selected the territory. Both male and female took part in building nest. The nest was a circular depression encircled by stones or pieces of hard clay. Egg length, egg width, egg weight, egg volume, egg shape index and egg specific gravity observed were 40mm, 30.17mm, 20.27gm 16.63ml, 75.42 and 1.21g/cm³ respectively. The incubation period of 27 days was completed by both parents. The hatching success observed was 75%. Both parents protected the territory and protected their young ones completely till became good fliers. The hatchlings were able to fly within 21-27 days after hatching. The overall breeding activities were completed within 64-77 days.

Keywords

Breeding, Hatching,
Hatchling,
Incubation, Nesting

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Introduction

Vanellus indicus belongs to the family Charadriidae of the order Charadriiformes. The red-wattled lapwing is a terrestrial bird of open fields. They prefer to live in outskirts of towns and villages in open fields near wetlands and are often found in pairs or trios. This species occurs geographically and generally from Iran, Iraq, the Arabian/Persian

Gulf to all South Asia including India, Pakistan, Afghanistan, Nepal and Bangladesh (Ali and Ripley, 2001; Birdlife International, 2009). Globally, conservation status of red wattled lapwing is least concern (IUCN, 2018). These are common, widespread and large waders of Indian subcontinent. Red-wattled lapwings are about 35cm long with brownish back having purplish sheen but the head, chest, front and back of neck are black.

A patch of white color can be seen running from tail through the belly flanking the neck to the sides of the crown. A red colored wattle in front of each eye, a dark grey tipped red beak and long yellow legs are seen. In flight, prominent white wing bars formed by the white on the secondary coverts. Males and females are indistinguishable but males have a longer wing with a longer carpal spur. It usually feeds on beetles, ants, caterpillars and vegetable residues (Grimmett *et al.*, 2008).

Casting of nest is an important part of bird's biology as it plays a key role in shaping the relationships between parents with their offspring. Nidification behavior is also very important for maintaining the ecological and genetically balances, (Saxena and Saxena, 2013). In natural conditions, the eggs of *Vanellus indicus* are laid in a 'ground scrape' or a depression, sometimes fringed with pebbles and goat, or, hare droppings (Sharma 1992), although there are reports of breeding on buildings in cities (Muralidhar and Barve, 2012). *Vanellus indicus* is a monogamous bird which is very specific about breeding areas. The mating site is chosen by male whereas female lapwing lay about 3-4 eggs in a little depression in open areas or ground which is surrounded by pebbles or bits of hard earth (Saxena and Saxena, 2013). The courtship behavior is displayed from March to June. Incubation of about takes 28-30 days is performed by both the guardians followed by hatching. Precocial chicks are capable of leaving the nest almost immediately after hatching and are able to follow the parents in search of food. Both guardians secure nesting region, and also ensure that the young have developed full plumage (3 to 5 weeks) and have become strong fliers, (Saxena and Saxena, 2013; Muralidhar and Barve, 2013). Factors like predators including house crow (*Corvus splendens*), pariah kite (*Milvus migrans*), dogs, cats and anthropogenic activities (Khalil *et al.*, 2018), human threats

to ground-nesting birds (Fletcher *et al.*, 2005) or the inadvertent trampling of eggs or chicks by cattle (Taej Mundkur, *pers. comm.* 2011) are responsible for the destruction of eggs. The aim of the present study was to study the breeding biology and egg parameters of red-wattled lapwing in agricultural fields of Haryana.

Materials and Methods

The breeding biology of *Vanellus indicus* was studied in agricultural fields of village Ramnagar, Sirsa, Haryana during the month of February to April, 2020. A pair of red wattled lapwing was spotted. Frequent sightings of bird(s) during the breeding period were suggestive of the presence of a breeding pair there. Nesting material used and site of nesting of nest was observed with naked eyes throughout the study period. The observations were taken with full precautions without disturbing birds. Number of eggs laid, clutch size, incubation period, number of hatchlings were recorded. Nests were monitored twice a day i.e. in morning and evening. Number of eggs damaged and hatching success was also observed. The egg length and width was measured using a digital LCD vernier caliper. Digital weighing machine was used to weigh the eggs and recordings were taken. 2 eggs were collected from the nests to calculate the egg parameters including egg volume, egg shape index and specific gravity. To estimate the egg volume data was analyzed using empirical formula given by Galbraith, 1988, using parameters length (L) and breadth (B):

Egg Volume = $(0.457) \times (L) \times (B^2) \times 10^{-3}$ ml
Egg shape index was estimated using the micrometer according to Anderson *et al.*, (2004) using the equation:

$$\text{Egg shape index} = \frac{\text{Egg breadth (mm)}}{\text{Egg length (mm)}} \times 100$$

According to this the eggs were classified

with respect to shape index (SI), namely as a sharp egg (SI < 72), a normal (standard) egg (SI = 72–76) or a round egg (SI > 76) (Sarica and Erensayin, 2009).

Egg specific gravity was calculated according to Stadelman and Cotterill, (1995) using the equation:

$$\text{Egg specific gravity} \left(\frac{\text{gm}}{\text{cm}^3} \right) = \frac{\text{Egg weight (gm)}}{\text{Egg volume (cm}^3)}$$

Hatching success was calculated with the traditional method (% of eggs that hatched successfully out of total eggs laid). Parental care and foraging habits during the incubation period were recorded. In addition, their behavior towards potential predators and human beings was also noted. Photographs were taken through a Sony DSLR Cyber-shot digital camera.

Results and Discussion

Breeding Biology of Red wattle lapwing

The birds were spotted moving in pairs between 4 -6 March, 2020 in agricultural fields. The male initiated the courtship. Male reached first towards the female with its puffed feathers, fanned tail, the neck in stretched position and the beak pointing upwards. The male bird showed tumbling flights and produced songs. Female responded to these antics of the male by giving short, quickly repeated calls. Singh, (2004) also observed that the male produces mating call in the form songs, show flights and mock.

The territory was first acquired by the male followed by call notes to the female and once the female arrived she was greeted by the male by wheeling in air. A territory was maintained by the breeding pair in the surrounding of their nest. The site selection has been studied in birds (Clark and Shulter,

1999). The area of territory was protected by both the parents and any intrusion in that area resulted in alarming calls by the parents and they also attacked the intruder.

Nest building started on 15th March 2020. Both birds participated in nest building. The construction of nest started from early morning up to noon and then in evening on successive days which was similar to nest building behavior of passerine birds (Collias, 1997). Both parents participated equally in nest construction. Initially, they gathered nesting material like pebbles, sticks from surrounding areas which was in accordance with Balkhande and Shaikh, (2017). Then the pair scraped off the upper layer of the hardened soil on the ground and made a depression using toes and pebbles were placed in the nest one by one using their beaks. The width and depth of the nest measured was 24.5 cm and 3.4cm respectively. The nest was perfectly in camouflage to the surrounding land color and texture due to which it was very difficult to locate the nest of this lapwing.

The size of clutch in Red- wattle lapwing was observed to be of four eggs which were in range of 3–4 eggs reported by Kumar & Sharma (2011). The eggs were laid on alternate days starting from 21 March 2020 till 25 March 2020 i.e. in 5 days while Muralidhar and Barve (2013) observed that cryptic four eggs were laid in a period of four days. The arrangement of the eggs was such that the edges meet in the center, making it easier for the lapwing to incubate the eggs.

The eggs of Red wattle lapwing were dotted type much pointed towards the other with a pale olive green color. On the surface dark brownish or black markings or spots were observed all over the egg. The incubation process took near about 27 days which was more than Saxena and Saxena, (2013),

Balkhande and Shaikh (2017) who reported 24-25 days of incubation (2017) and less than Muralidhar and Barve (2013) who reported 30-32 days of incubation. The nest was observed during the whole study period. Three eggs hatched out successfully on 17th April, 2020 at a time difference of 2.5 –3 hours between each hatching which was immensely different from the observations of Saxena and Saxena (2013) who reported that the young hatched out one after the other starting at an interval of 46-48 hours. One egg didn't hatched and remained unattended by both parents. The hatching success of eggs calculated was 75%. The broken shells were cleared away from the nest and dropped into an outer area by both the parents.

After hatching the male and female Lapwing were observed to jointly take up the all responsibility of rearing the young ones as

they were constantly vigilant and called incessantly. They remained active at all hours and were often heard even past midnight, probably driving away potential predators. The hatchlings were covered with grayish brown colored feathers. They had a broad white collar, a black pectoral band, the chin and rest of the under parts were white tinged whereas the belly and the flanks were light brownish colored. The newly born chickens were nidifugous as they left the nest as soon as they were dry and were able to move about with great ease. Their brown color helped them to blend in the surroundings. The brooding mother kept freshly hatched young warm at night. Day brooding stops after 3-5 days of first hatching. Night brooding stopped only after the chicks were partly fledged which took about 14 days. The hatchlings were able to fly within 21-26 days after hatching (Table 1 and Fig. 1).

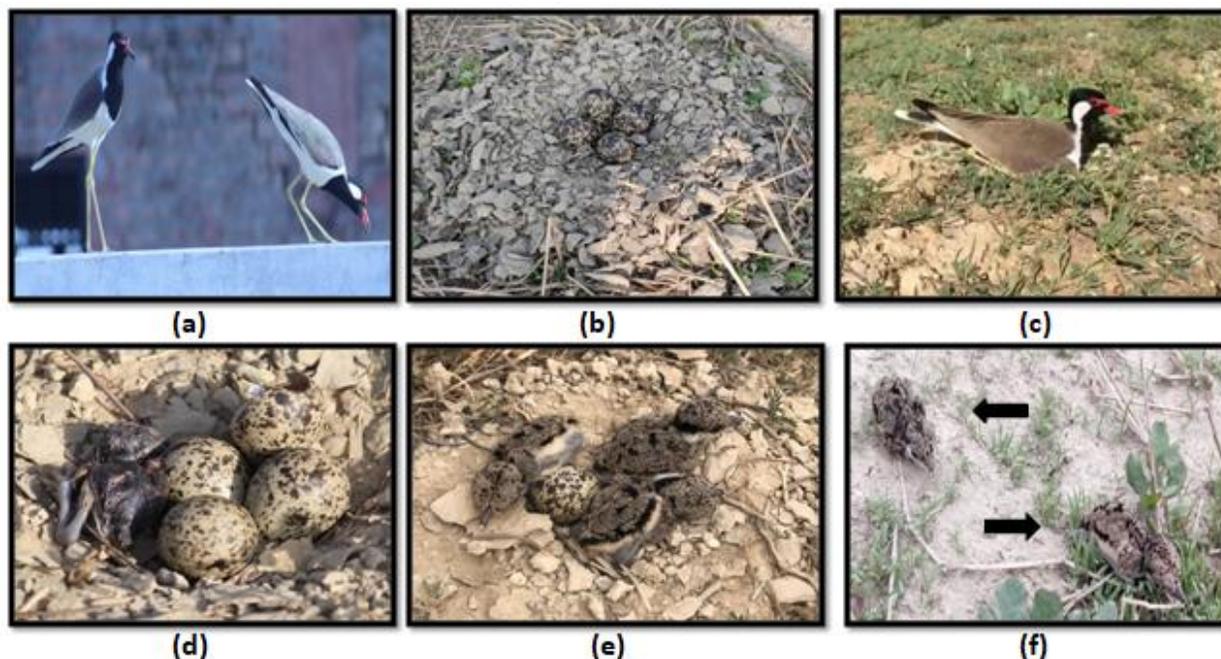
Table.1 Breeding biology of Red-wattled lapwing (*Vanellus indicus*)

Breeding activities	Observations
Site selection	8-10 days
Nidification	6-8 days
Egg laying	5 days
Egg color	Olive green with black spots
Clutch size	4
Number of eggs hatched	3
Incubation	23-27 days
Hatching	1 day
Hatching success of eggs	75%
Fledging	21-26 days
Overall breeding activity	64-77 days

Table.2 Egg parameters of Red-wattled lapwing (*Vanellus indicus*)

Egg Parameters	Observations
Egg length	40 mm
Egg width	30.17 mm
Egg weight	20.27 gm
Egg volume	16.63 ml
Egg shape index	75.42
Egg specific gravity	1.21 gm/cm ³

Figure.1 (a) Spotting of Red-wattled lapwing pair, (b) Egg of lapwing, d) Bird during Incubation period (e) Initiation of hatching, (f) Hatchlings, (g) Nidifugous behavior of hatchlings



Eggs parameters of red wattle lapwing

Egg length, width and weight observed were 40mm, 30.17mm and 20.27gm respectively which were in accordance with the observations of Kaur and Khera, (2017). Egg volume, egg shape index and egg specific gravity calculated were 16.63ml, 75.42 and 1.21g/cm^3 respectively. As per the value of shape index (75.42) the eggs of red-wattled lapwing were classified as a normal (standard) egg with SI = 72–76.

Both the partners incubated the eggs but most of the time in a day female did most the work of incubation. The male helped the female in some time mostly during the hot afternoons in scorching heat of sun (Table 2).

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